



Figure 18. Dumping roots using a forklift-mounted bin rotator device. (PHOTO BY G. HOLMES)



Figure 19. Dumping roots using an automatic bin rotator. (PHOTO BY G. HOLMES)



Figure 20. Dump tank with metal bib to sift out soil. (PHOTO BY G. HOLMES)

meters/second squared) with higher numbers indicating areas or drops on packinglines where potentially damaging impacts are occurring. The original device used by researchers was called an *instrumented sphere* because of its shape, and a major improvement has been the development of a urethane or silicon casing that mimics the dimensions of the commodity being tested. The North Carolina State

University engineering department fabricated a casing by making a mold of an actual sweetpotato (U.S. No. 1 grade, Figure 17). This casing allows for measurements that reproduce impacts received by sweetpotatoes on a packing line. Impacts occurring at specific points on the packing line will be discussed further and are summarized in Tables 2 and 4.

Dump Tank. Sweetpotatoes are generally dumped into a tank of water (dump tank) either by a bin rotation device on a forklift (Figure 18) or an automatic bin rotator (Figure 19). Because harvested roots go directly into storage without washing, sweetpotatoes always have significant amounts of soil adhered to the surface, even when harvested from dry, sandy soil. Some dump tanks have a bib of small metal bars that sift the loose soil out as the roots tumble into the dump tank (Figure 20). The bib prevents some of the soil from entering the water, but the impact of the roots on the bars is high and is also a major source of mechanical injury. Skinning is particularly severe because dry roots skin much easier than wet roots. Because the severity of damage is directly related to the distance of the fall, automatic bin rotation equipment (which shortens the fall distance) is preferred to bin rotators on forklifts. A better option is an automatic bin rotator with a lid, which gradually releases the roots into the dump tank and minimizes root-to-root impacts. The best option for minimizing root injury is the “submerged dump” (Figure 21). This requires specialized equipment that completely submerges the entire bin into



Figure 21. In a submerged dump, the entire storage bin is placed in the dump tank, and roots float out. (PHOTO BY G. HOLMES)

a water tank, allowing the roots to float out and virtually eliminating root-to-root impacts. Submerged dumps have yet to be adopted in the Southeast mainly due to the expense associated with the equipment and the transition to plastic storage bins. (Wooden bins quickly break down when wet and are poorly suited for this type of dump.)